



H3 Features

- Ball-bearing option tracks to 10,000 RPM
- 2-channel quadrature, TTL squarewave outputs
- 3rd channel index option available on some resolutions
- 64 to 10,000 cycles per revolution (CPR)
- 256 to 40,000 pulses per revolution (PPR)
- Wide operating temperature
- Single +5VDC supply



H3 Product Description

The H3 series ball-bearing optical shaft encoder has a glass-filled polymer enclosure. This non-contacting rotary to digital converter is designed to provide digital feedback information. The H3 is fully assembled with a brass shaft, two 1/4 in. ID by 1/2 in. OD ball bearings and a mounting plate. The mounting plate comes with 4 mounting holes for #2 - #4 size screws.

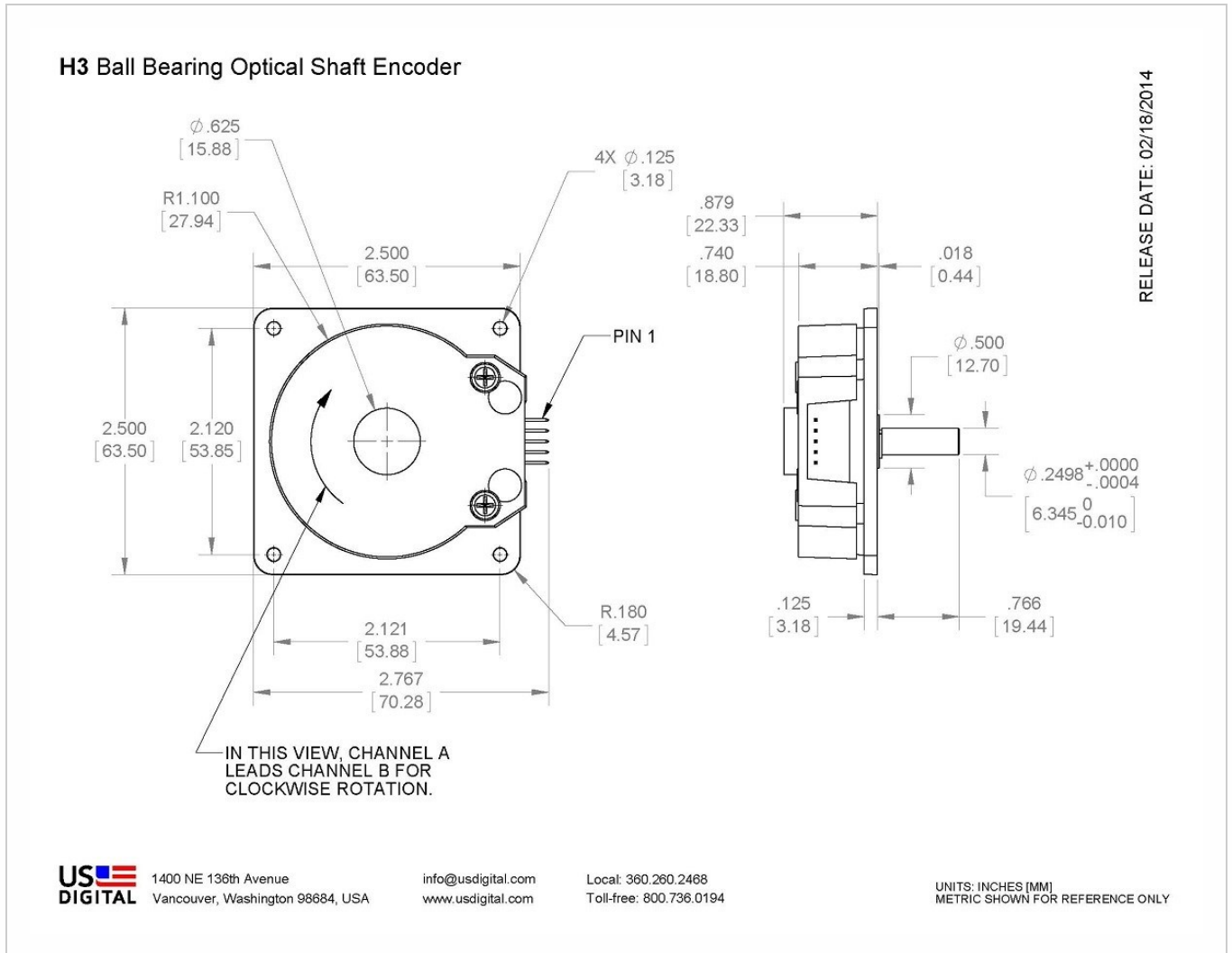


The H3 is designed to drive cables up to 10 feet long. For longer cable lengths, adding a PC4

(<https://www.usdigital.com/products/accessories/interfaces/cable-drivers/pc4/>)/PC5 ([https://www.usdigital.com/products/accessories/interfaces/cable-](https://www.usdigital.com/products/accessories/interfaces/cable-drivers/pc5/)

[drivers/pc5/](https://www.usdigital.com/products/accessories/interfaces/cable-drivers/pc5/)) differential line driver is recommended. A connection to the H3 series encoder is made through a 5-pin standard connector. The mating connectors are available from US Digital with several cable options and lengths.

Mechanical Drawings



Specifications

ENVIRONMENTAL

PARAMETER	VALUE	UNITS
Operating Temperature (CPR < 3600)	-40 to 100	C
Operating Temperature (CPR ≥ 3600)	-25 to 100	C
Vibration (5Hz to 2kHz)	20	G
Electrostatic Discharge, IEC-61000-4-2	± 4	kV



MECHANICAL

PARAMETER	VALUE
Max. Acceleration	100000 rad/sec ²
Max. Shaft Speed (mechanical)	10000 RPM (1)
Max. Shaft Torque	0.05 in-oz
Max. Shaft Loading	2 lbs.
Bearing Life	life in millions of revs = $(90/P)^3$ where P = radial load in pounds.
Weight	2.69 oz.
Max. Shaft Runout	0.006 in. T.I.R.
Mounting Plate Screw Torque	(#2-56) 2-3
Moment of Inertia	0.001 oz-in-s ²
Technical Bulletin TB1001 - Shaft and Bore Tolerances	Download (https://www.usdigital.com/support/resources/reference/technical-docs/technical-bulletins/shaft-and-bore-tolerances-tb1001/)

(1) The maximum speed due to electrical considerations is dependent on the CPR. See the EM1 (<https://www.usdigital.com/products/encoders/incremental/modules/em1/>) and EM2 (<https://www.usdigital.com/products/encoders/incremental/modules/em2/>) product pages.

PHASE RELATIONSHIP

B leads A for clockwise shaft rotation, and A leads B for counterclockwise rotation when viewed from the shaft side of the encoder.



ELECTRICAL

- Specifications apply over the entire operating temperature range.
- Typical values are specified at $V_{cc} = 5.0V_{dc}$ and $25^{\circ}C$.
- For complete details, see the EM1 (<https://www.usdigital.com/products/encoders/incremental/modules/em1/>) and EM2 (<https://www.usdigital.com/products/encoders/incremental/modules/em2/>) product pages.

PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITIONS
Supply Voltage	4.5	5.0	5.5	V	
Supply Current		27	33	mA	CPR < 1000, no load
		54	62	mA	CPR \geq 1000 and < 3600, no load
		72	85	mA	CPR \geq 3600, no load
Low-level Output			0.5	V	$I_{OL} = 8mA$ max., CPR < 3600
			0.5	mA	$I_{OL} = 5mA$ max., CPR \geq 3600
		0.05		mA	no load, CPR < 3600
		0.25		mA	no load, CPR \geq 3600
High-level Output	2.0			V	$I_{OH} = -8mA$ max., CPR < 3600
	2.0			V	$I_{OH} = -5mA$ max., CPR \geq 3600
		4.8		V	no load, CPR < 3600
		3.5		V	no load, CPR \geq 3600
Output Current Per Channel	-8		8	mA	CPR < 3600
	-5		5	mA	CPR \geq 3600
Output Rise Time		110		nS	CPR < 3600
		50		nS	CPR \geq 3600
Output Fall Time		35		nS	CPR < 3600
		50		nS	CPR \geq 3600



PIN-OUT

PIN	DESCRIPTION
1	Ground
2	Index
3	A channel
4	+5VDC power
5	B channel



PRODUCT CHANGE NOTIFICATIONS

Title	Date	Description	Download
Laser Marking - PCN 5253	6/17/2015	As part of our ongoing continuous improvement efforts, US Digital is changing the labeling/marketing method for our E3, E6, H3, H6, S1, S2, and S6 products.	Download (https://www.usdigital.com/support/resources/product-change-notifications/pcn-5253-laser-marking/)
EM1 & EM2 Update - PCN 4199	1/14/2014	Based on our continuous process improvement program, US Digital is changing the current marking method for our EM1 and EM2 encoder modules to a serialization method. This change will allow for each module to have a unique code; the current marking method is based on a date code system that includes all encoder modules produced within a specific week/year. The serialization system will be based on a hexadecimal system.	Download (https://www.usdigital.com/support/resources/product-change-notifications/pcn-4199-em1-em2-update/)
EOL Sealed Housing Option - PCN 1021	4/11/2013	This PCN is a formal notification that US Digital is discontinuing the Sealed Housing option for the following products: <ul style="list-style-type: none"> • A2 Absolute Optical Encoder • A2T Absolute Optical Inclinometer • H1 Ball Bearing Optical Shaft Encoder • H3 Ball Bearing Optical Shaft Encoder • S1 Optical Shaft Encoder • S2 Optical Kit Encoder <p>The Sealed Housing option provides the encoder with the low-level capability of surviving in moisture environments, however, the encoder is NOT waterproof or intended to be used in applications where this is required.</p>	Download (https://www.usdigital.com/support/resources/product-change-notifications/pcn-1021-eol-sealed-housing-option/)
EM1 LED Die - PCN 1016	2/7/2013	As part of US Digital's continual assurance of supply strategy, we have qualified additional sources for our LED die used in our EM1 encoder module, which in turn impacts all of the following products: <p>EM1, E2, E3, E5, E6, H1, H15, H3, H5, H6, HB5M, HB6M, HD25, PE, S1, S2, S5, S6, T5 and T6</p> <p>The device specification will remain the same, i.e. there will be no change to form, fit, or function of the product(s) as specified by US Digital. The appropriate quality and reliability testing have been performed on representative products to ensure normal parametric distribution, consistent with US Digital's quality and reliability standards.</p>	Download (https://www.usdigital.com/support/resources/product-change-notifications/pcn-1016-em1-led-die/)

Notes

- Cables and connectors are not included and must be ordered separately.
- US Digital® warrants its products against defects in materials and workmanship for two years. See complete warranty (<https://www.usdigital.com/company/warranty>) for details.